

In Vitro Fertilization

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In vitro fertilization (IVF) is a medical procedure in which a human egg is fertilized outside of the body, and then reinserted into the womb (1). Approximately four million babies have been born by IVF since it was first introduced in the 1980s (1).

Despite its prevalence, ethical questions have recently been raised about the usage of IVF (2). Specifically, ethicists are concerned with the potential misuse of “pre-implantation genetic diagnosis,” or PGD (2). In the early 1990s, scientists developed PGD as a way of genetically screening embryos for inherited diseases (2). The ability to test for non-essential traits, such as hair color, has emerged in recent years. This technology is the source of controversy: just what should IVF clients be allowed to select for in their fertilized embryos? While the characteristics that can be selected for today are limited—and primarily cosmetic—the future may bring about new choices with greater ethical and demographic concerns.

The chief purpose of PGD remains to screen for genetic diseases. Technicians remove a cell from a fertilized three-day old embryo, and then analyze its DNA for inherited diseases (2). Embryos that will certainly produce children with diseases, such as Huntington’s chorea or cystic fibrosis, can be kept from being implanted into the womb (2). To date, screening can identify approximately 130 different inherited diseases. Additional diseases are being added as the understanding of the human genome grows.

Gender Selection

The ability to identify physical traits in embryos is an extension of disease screening. The most common trait that is screened for is gender. Though Western culture does not necessarily favor one sex over another, many Asian countries, such as China and India, place a cultural premium on boys (3). As a result, PGD sex screening has be-

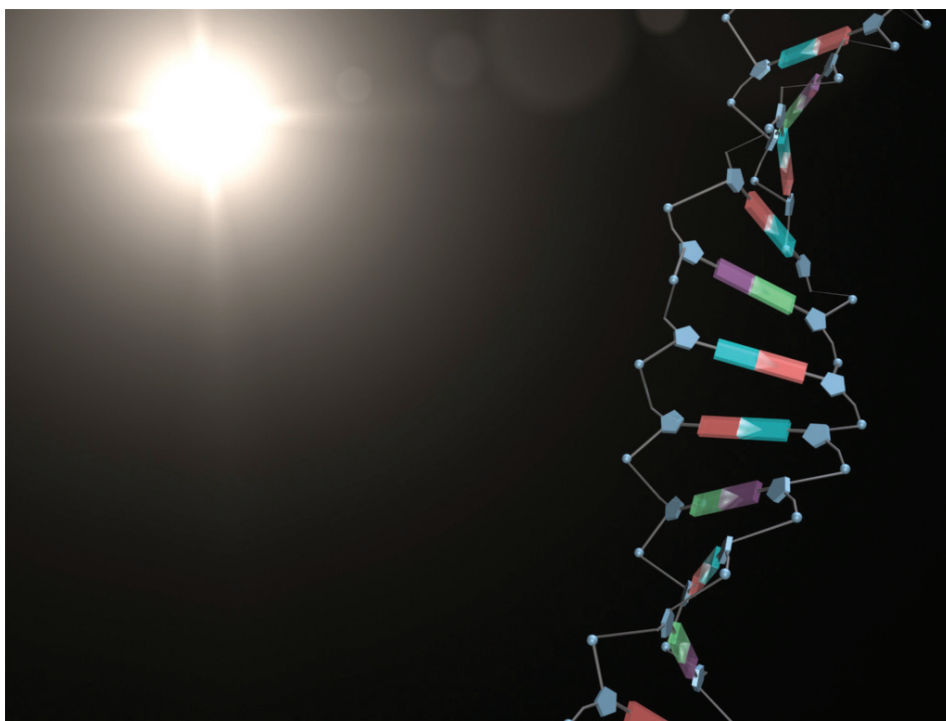


Image retrieved from <http://upload.wikimedia.org/wikipedia/commons/0/07/DNA.jpg> (Accessed 1 Feb 2011).

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come prevalent in these countries (3).

The result is an imbalance of men and women. In some states of India, the female to male ratio is as displaced as 810 females to 1000 males, and in some areas of China, as disproportionate as 677 females to 1000 males (3).

For this reason, medical experts strongly oppose sex screening. Not only is the gender selection perceived as unethical, but serious demographic dangers underlie it. Population growth could be significantly slowed, and crimes against women increase in such forms as marriage trafficking. (3)

Several countries have consequently banned sex screening, including the United Kingdom, Canada, Japan, and Australia (3). While none of these nations have a strong cultural bias for a particular gender, strong opinions and the recognition of the potential dangers of gender imbalance have kept sex screening from these countries.

However, the United States has not banned sex screening. According to a 2006 survey by the Genetics and

Public Policy Center at Johns Hopkins University, 42% of 137 PGD clinics in the U.S. allow clients to select for gender (5). This is because the majority of gender screens in the U.S. have been for the purposes of family balancing (5). For instance, couples with several sons may select for a daughter, and vice versa. Given these cultural differences and the relatively small demand for sex screening in the U.S., many medical experts accept sex selection as a matter of convenience rather than as an ethical or demographic dilemma. In moderation, sex screening does not pose a danger.

Cosmetic Selection

PGD screens for cosmetic purposes are not as benign as gender selection. For a time, the LA Fertility Institutes, an IVF clinic in CA, promised clients “a pre-selected choice of gender, eye color, hair color and complexion, along with screening for potentially lethal diseases” (5).

This claim was backed by a medi-



Image courtesy of RWJMS IVF Laboratory

Sperm injection into oocyte.

cal report describing a more precise way of extracting DNA from embryos. In 2008, Dr. William Kearns, director of the Shady Grove Center for pre-implantation genetics, proposed a method of amplifying the small amount of DNA collected from fertilized embryos. A PGD screen typically does not harvest enough genetic material to sufficiently test for many phenotypic traits. In his clinical reports, however, Kearns stated that he was able to identify the genes responsible for hair, eye and skin pigmentation in 80% of his samples.

Despite the science, the LA Fertility Institutes was not able to produce any such designer babies. Great public backlash followed the LA Institutes' announcement. Among many conservative voices, the Pope condemned the method and "the obsessive search for the perfect child [that inspired it]" (6).

The public outcry was seconded by medical ethicists. They reasoned that the ability to choose for a particular eye or hair color, while relatively benign on its own, could lead to the development of other screens with more dangerous consequences (3). In a survey of 999 people who sought out counseling for potential genetic screening, 10% said they would screen for athletic ability, 10% for improved height, and 13% for superior intelligence (6).

The demographic risks associ-

ated with these types of selection are great. According to Kari Stefansson of deCODE, a genetics research group, access to such screening could "decrease human diversity and that's very dangerous for the gene pool" (5). Social concerns are also relevant. "If we're going to produce children who are claimed to be superior because of their particular genes, we risk introducing new sources of discrimination," stated Marcy Darnovsky, associate executive director of the center for genetics and society, a nonprofit public interest group in Oakland, CA (5). Following this public and scientific opposition, the Institutes cancelled their selection program only two months after it began advertising it (6).

Conclusion

While the technology to pick and choose traits from raw genetic data is not yet available, medical ethicists are already campaigning for its ban. Scientists agree that the healthy development of genetically modified babies will not justify the use of PGD for cosmetic purposes (4). Opinions about the morality of genetic screening may be debatable, but the potential demographic dangers will always remain and limit the use of PGD screening.

References

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